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334. The spinal fusion implant of claim 330, in combination with a fusion promoting material.

335. The spinal fusion implant of claim 334, wherein said fusion promoting material includes at least one of bone, bone morphogenic protein, hydroxyapatite, hydroxyapatite compounds, and osteogenic proteins.--

REMARKS

In the Office Action dated April 23, 2002, at page 2, second paragraph, the Examiner addressed two errors in the numbering of the pending claims. In particular, the Examiner noted that no claim 46 was originally presented with claims 1-136 as the application was originally filed. The Examiner also noted that there was no claim 152 in the Amendment dated March 27, 1997 submitting new claims 137-167. The Examiner stated that the response to this Action must include appropriate measures to bring all claim numbering into compliance with the applicable rules.

In response to the Examiner's requirement to bring the claim numbering into compliance with the rules, Applicant has cancelled all previously pending claims and is submitting for examination new claims 173-335. The newly presented claims do not include various of the now cancelled claims that were objected to by the Examiner as lacking support in the specification. The newly presented claims have re-ordered the now-cancelled dependent claims so that the dependent claims follow their respective independent claims. Applicant submits that all of the rejections based on the cited art are rendered moot in view of the cancellation of the previously pending claims. Applicant submits that new claims 173-335 are allowable over the art of record.

Applicant amended the specification to update the related application information as suggested by the Examiner and to correct minor informalities. No new matter has been added.

In the Office Action, the Examiner objected to the specification under 37 C.F.R. 1.75(d)(1) as not providing antecedent basis for an insertion end being larger than a trailing end. Applicant amended the specification at the end of the paragraph bridging pages 9 and 10 to provide antecedent basis for an insertion end being larger than a trailing end. Support for the amendment may be found, for example, in claim 30 as originally filed.

The Examiner objected to the drawings under 37 C.F.R. § 1.83(a) as not illustrating the claimed subject matter of claims 16, 28, 41, 66, 88, 114, 144, and 151. Applicant cancelled claim 28 and have not included a similar claim among the newly presented claims, thereby rendering the objection to the drawings in relation to that subject matter moot. Applicant respectfully traverses the objection to the drawings in relation to the subject matter of now cancelled claims 16, 41, 66, 88, 114, 144, and 151. Cancelled claims 16, 41, 66, 88, 114, 144, and 151 recite that the surface roughenings include knurling. This subject matter is now presented in pending claims 186, 211, 234, 254, 278, 316, and 326. 35 U.S.C. § 113 (first sentence) states that the “applicant shall furnish a drawing *where necessary for the understanding of the subject matter to be patented.*” (Emphasis added). Applicant submits that knurling does not require a drawing since the subject matter would be understandable to one of ordinary skill in the art.

Under the heading "Drawings" on page 3 of the Office Action, the Examiner noted several minor informalities relating to the specification and drawings. Applicant amended the specification and drawings as suggested by the Examiner except in relation to the reference number "339" on page 11, line 11. Applicant respectfully refers the Examiner to Figure 8 where the reference number 339 is used to illustrate the interstices described on page 11, line 11 of the specification.

The Examiner rejected claims 163-167 under 35 U.S.C. § 112, first paragraph, as not complying with the written description requirement. Applicant cancelled claims 163-167 and have not included them in newly presented claims 173-335, thus rendering this rejection moot.

In view of the foregoing amendments and remarks, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the newly presented claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 50-1066.

Respectfully submitted,

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CHANGES TO THE SPECIFICATION

Please amend as follows:

Page 2, paragraph 1:

-- This application is a continuation in part of co-pending United States application Serial No. 08/396,414 filed on February 27, 1995, now United States Patent No. 6,080,155; which is a continuation-in-part of United States application Serial No. 08/074,781 filed on June 10, 1993, now United States Patent No. 5,484,437; which is a continuation in part of United States application Serial No. 07/698,674 filed on May 10, 1991, abandoned; which is a divisional of application Serial No. 07/205,935 filed on June 13, 1988, now United States Patent No. 5,015,247; all of which are incorporated herein by reference.--

Page 2, paragraph 2:

--This application is also a continuation-in-part of United States application Serial No. 08/390,131 entitled Interbody Spinal Fusion Implants filed on February 17, 1995, now United States Patent No. 5,593,409.--

Page 9, second full paragraph:

--While the implant 220 is shown as being solid, it is appreciated that the implant 220 can be hollow at least in part to provide an internal chamber for holding bone or any fusion promoting material. Such an implant could have openings to allow bone external to the implant to grow into the internal chamber. Such structure is disclosed in detail in co-pending application serial no. 08/390,131, now U.S. Patent 5,593,409 and co-pending application serial no.

08/074,781, now U.S. Patent No. 5,484,437, both of which are incorporated herein by reference.--

Paragraph bridging pages 9 and 10:

--Referring to Figure 3A, an alternative embodiment of the implant 220 is shown and generally referred to by the numeral 220'. The implant 220' is similar in configuration to implant 220 except that the body 222' of the implant is frusto-conical in configuration and the ratchetings 240' have a radius R_3 measured from the longitudinal central axis L_4 that is constant in size from the insertion end 224' to the trailing end 226'. The ratchetings 240' each have a height measured from the body 222' that is not constant throughout the length of the implant 220' and decreases from the insertion end 224' to the trailing end 226'. In this manner, the ratchetings 240' form an external configuration of the implant 220' that is substantially cylindrical in shape, while the body 220'222' is frusto-conical. The insertion end of implant 220' may have a tapered portion 223' of lesser diameter to facilitate insertion of the implant 220'. The insertion end of the implant may also be larger than the trailing end where so desired.--

Page 10, first full paragraph:

--Referring to Figures 4 and 5, an alternative embodiment of the implant 220 is shown and generally referred to by the numeral 220". The implant 220" is similar in configuration to implant 220 and has ratchetings 240" having a radius R_5 measured from the longitudinal central axis L_5 that increases in size from the insertion end 224" to the trailing end 226". The ratchetings 240'240" each have a height measured from the body 222" that is not constant throughout the length

of the implant 220". In the preferred embodiment, the ratchet radius R_5 and the ratchet height increase in size from the insertion end 224" to the trailing end 226".--

Page 10, second full paragraph:

--As shown in Figure 5, the implant 220'220" has truncated sides 270 and 272 forming two planar surfaces which are diametrically opposite and are parallel to the longitudinal axis L_4L_5 . In this manner, two implants 220'220" may be placed side by side with one of the sides 270 or 272 of each implant touching, such that the area of contact with the bone of the adjacent vertebrae and the ratcheting 240'240" is maximized. Alternatively, the implant 220'220" may have one truncated side.--

Page 11, first full paragraph:

-- Referring to Figures 9 and 10, alternatively the implant 320a-may be made of a cancellous material 350, similar in configuration to human cancellous bone, having interstices 352 such that the outer surface 338 has a configuration as shown in Figures 9 and 10. As the implant 320a-may be made entirely or in part of the cancellous material 350, the interstices 352 may be present in the outer surface 338 and/or within the entire implant 320a-to promote bone ingrowth and hold bone fusion promoting materials.--

Page 11, second full paragraph:

--Referring again to Figure 7, the implant 320a is partially frusto-conical, similar in shape to implant 220 but having at least one truncated side 340 that forms a planar surface parallel to the central longitudinal axis of implant 320a.

The truncated side 340 allows for the placement of two implants 320a and 320b closer together when placed side by side between two adjacent vertebrae as set forth in U.S. Patent Application Serial No. 08/390,131, now U.S. Patent No. 5,593,409, incorporated herein by reference. Implant 320a may be partially threaded or may otherwise resemble any of the other embodiments herein described or that are functionally equivalent.--.



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FIG. 3A

